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William J. McGinnis, Jr. IBM Corporation, Dept. 917 3605 Highway 52 North Rochester, MN 55901-7829			SAEED, USMAAN	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/618,410	Applicant(s) DETTINGER ET AL.	
	Examiner Usmaan Saeed	Art Unit 2166	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/23 & 10/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-42 are pending in this office action.

Information Disclosure Statement

2. Applicants Information Disclosure Statement, filled 07/11/2003 and 10/26/2004, has been received, entered into record, and considered. See attached form PTO-1449.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7, 10-12, 15-17, 20-26, 29-31, 34-36, and 39-42 are rejected under 35 U.S.C. 102(e) as being anticipated by **Snodgrass et al.** (**Snodgrass** hereinafter) (U.S. PG Pub No. 2004/0117359).

With respect to claim 1, **Snodgrass teaches a method for managing query execution in a data processing system, comprising:**

“providing at least one query execution schedule configured to schedule specific queries against a database in the data processing system” as a set of candidate algebraic query plans is produced by means of the optimizer's transformation rules and heuristics. Next, the optimizer considers in more detail each of these plans. For each algebraic operation in a plan, it assumes that each of the algorithms available for computing that operation is being used, and it estimates the consequent cost of computing the query. This way, one best physical query execution plan, where all operations are specified by algorithms, is found for each original candidate plan (**Snodgrass Paragraph 0028**). Therefore one of the best plan/schedule is being chosen for the execution of a query.

“receiving a query against the database” as a user application layer for interaction between the user and said database-based application for entering queries, a middleware layer overlying a Database Management System (DBMS) and said middleware layer being intended for processing temporal queries from the user, a Database Management System (DBMS) layer for processing queries and for accessing data in a database (**Snodgrass Paragraph 0015**).

“managing execution of the received query on the basis of the at least one query execution schedule” as a set of candidate algebraic query plans is produced by means of the optimizer's transformation rules and heuristics. Next, the optimizer considers in more detail each of these plans. For each algebraic operation in a plan, it

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assumes that each of the algorithms available for computing that operation is being used, and it estimates the consequent cost of computing the query. This way, one best physical query execution plan, where all operations are specified by algorithms, is found for each original candidate plan (**Snodgrass** Paragraph 0028). Therefore one of the best plan/schedule is being chosen for the execution of a query.

Claims 20 and 39 are essentially the same as claim 1 except they set forth the claimed invention as a computer readable medium containing a program and a system and are rejected for the same reasons as applied hereinabove.

With respect to claim 2, **Snodgrass** teaches **the method of claim 1, wherein managing the execution of the received query comprises:**

“determining, whether the received query is a specific query” as the stratum maps temporal SQL statements to regular SQL statements and passes them to the DBMS, which remains unaltered (**Snodgrass** Paragraph 0005). Specific queries are received since specific query language like SQL is being used.

“if so, scheduling execution of the received query using the query execution schedule” as a set of candidate algebraic query plans is produced by means of the optimizer's transformation rules and heuristics. Next, the optimizer considers in more detail each of these plans. For each algebraic operation in a plan, it assumes that each of the algorithms available for computing that operation is being used, and it estimates the consequent cost of computing the query. This way, one best

physical query execution plan, where all operations are specified by algorithms, is found for each original candidate plan (**Snodgrass** Paragraph 0028). Therefore one of the best plan/schedule is being chosen for the execution of a query.

Claim 21 is essentially the same as claim 2 except it sets forth the claimed invention as a computer readable medium containing a program and is rejected for the same reasons as applied hereinabove.

With respect to claim 3, **Snodgrass** teaches “**the method of claim 1, wherein the at least one query execution schedule defines query eligibility criteria identifying the specific queries**” as means for selecting, according to a criteria, which query plan to be used when processing a query, said criteria being based on the result from said cost calculating means (**Snodgrass** Paragraph 0016). “**and a timeframe available for executing the specific queries**” as means for estimating the cost in processing resources according to each said query plan by estimating the selectivity of a temporal selection, said estimate of the selectivity intended for being performed by using the information that an end time of a period never precedes a start time of the period (**Snodgrass** Paragraph 0020).

Claim 22 is essentially the same as claim 3 except it sets forth the claimed invention as a computer readable medium containing a program and is rejected for the same reasons as applied hereinabove.

With respect to claim 4, **Snodgrass** teaches the method of claim 3, wherein the query eligibility criteria comprise at least one of:

“an estimated amount of resources required for execution of the specific queries” as the cost effective query plans can be chosen, avoiding that query plans demanding large resources compared to other plans are chosen. The resources could comprise the IO resources and CPU resources (**Snodgrass** Paragraph 0017).

an availability of data sources accessed by the specific queries

“a user submitting the specific queries

and an application submitting the specific queries” as a user application layer for interaction between the user and said database-based application for entering queries, a middleware layer overlying a Database Management System (DBMS) and said middleware layer being intended for processing temporal queries from the user, a Database Management System (DBMS) layer for processing queries and for accessing data in a database (**Snodgrass** Paragraph 0015). Therefore a user and an application are submitting the queries together.

Claims 10, 16, 23, 29, and 35 are same as claim 4 except claims 23, 29 and 35 set forth the claimed invention as a computer readable medium containing a program and are rejected for the same reasons as applied hereinabove.

With respect to claim 5, **Snodgrass** teaches “**the method of claim 1, wherein the at least one query execution schedule is statically defined by a human operator**” as generating a number of query plans according to queries having been entered by the user by means of said user application layer, each said query plan specifying combinations of operations to be performed and establishing whether the operation should be performed in the middleware layer or the DBMS layer (**Snodgrass** Paragraph 0016). Therefore the operations to be performed are specified by the user in the queries.

Claims 11, 24, and 30 are same as claim 5 except claims 24 and 30 set forth the claimed invention as a computer readable medium containing a program and are rejected for the same reasons as applied hereinabove.

With respect to claim 6, **Snodgrass** teaches “**the method of claim 1, wherein the at least one query execution schedule is dynamically defined by the data processing system on the basis of monitored system parameters**” as FIG. 2 describes the main function of the Execution Engine, which receives an execution-ready plan consisting of a sequence of algorithms with their parameters and arguments (**Snodgrass** Paragraph 0032).

Claims 12, 25, and 31 are same as claim 6 except claims 25 and 31 set forth the claimed invention as a computer readable medium containing a program and are rejected for the same reasons as applied hereinabove.

With respect to claim 7, **Snodgrass teaches a method for scheduling execution of a query against a database in a data processing system, comprising:**

“providing a plurality of query execution schedules” as a set of candidate algebraic query plans is produced by means of the optimizer's transformation rules and heuristics. Next, the optimizer considers in more detail each of these plans. For each algebraic operation in a plan, it assumes that each of the algorithms available for computing that operation is being used, and it estimates the consequent cost of computing the query. This way, one best physical query execution plan, where all operations are specified by algorithms, is found for each original candidate plan (**Snodgrass Paragraph 0028**). Therefore one of the best plan/schedule is being chosen for the execution of a query. **“each query execution schedule defining query eligibility criteria identifying specific queries”** as means for selecting, according to a criteria, which query plan to be used when processing a query, said criteria being based on the result from said cost calculating means (**Snodgrass Paragraph 0016**). **“and a timeframe available for executing the specific queries”** as means for estimating the cost in processing resources according to each said query plan by estimating the selectivity of a temporal selection, said estimate of the selectivity intended for being

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performed by using the information that an end time of a period never precedes a start time of the period (**Snodgrass** Paragraph 0020).

“receiving a query against the database” as a user application layer for interaction between the user and said database-based application for entering queries, a middleware layer overlying a Database Management System (DBMS) and said middleware layer being intended for processing temporal queries from the user, a Database Management System (DBMS) layer for processing queries and for accessing data in a database (**Snodgrass** Paragraph 0015).

“determining, for the received query, a suitable query execution schedule on the basis of the query eligibility criteria of the plurality of query execution schedules” as means for selecting, according to a criteria, which query plan to be used when processing a query, said criteria being based on the result from said cost calculating means (**Snodgrass** Paragraph 0016).

“scheduling execution of the received query against the database on the basis of the timeframe defined by the suitable query execution schedule” as means for estimating the cost in processing resources according to each said query plan by estimating the selectivity of a temporal selection, said estimate of the selectivity intended for being performed by using the information that an end time of a period never precedes a start time of the period (**Snodgrass** Paragraph 0020).

Claims 26 and 40 are essentially the same as claim 7 except they set forth the claimed invention as a computer readable medium containing a program and a system and are rejected for the same reasons as applied hereinabove.

With respect to claim 15, **Snodgrass** teaches a **method of providing a query execution schedule for scheduling execution of specific queries against a database in a data processing system, comprising:**

“defining query eligibility criteria identifying the specific queries to be scheduled by the query execution schedule” as means for selecting, according to a criteria, which query plan to be used when processing a query, said criteria being based on the result from said cost calculating means (**Snodgrass** Paragraph 0016).

“defining a timeframe available for executing the specific queries” as means for estimating the cost in processing resources according to each said query plan by estimating the selectivity of a temporal selection, said estimate of the selectivity intended for being performed by using the information that an end time of a period never precedes a start time of the period (**Snodgrass** Paragraph 0020).

“associating the query eligibility criteria and the timeframe with the query execution schedule” as means for selecting, according to a criteria, which query plan to be used when processing a query, said criteria being based on the result from said cost calculating means (**Snodgrass** Paragraph 0016). Means for estimating the cost in processing resources according to each said query plan by estimating the selectivity of a temporal selection, said estimate of the selectivity intended for being performed by

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using the information that an end time of a period never precedes a start time of the period (**Snodgrass** Paragraph 0020). They are both associated with the query plan/schedule.

Claims 34, 41, and 42 are essentially the same as claim 15 except they set forth the claimed invention as a computer readable medium containing a program, a system and a data structure and are rejected for the same reasons as applied hereinabove.

With respect to claim 17, **the method of claim 15, further comprising:**
“monitoring system parameters of the data processing system” as FIG. 2 describes the main function of the Execution Engine, which receives an execution-ready plan consisting of a sequence of algorithms with their parameters and arguments (**Snodgrass** Paragraph 0032).

wherein the defining of the query eligibility criteria and the timeframe comprises:

“dynamically defining the query eligibility criteria” as means for selecting, according to a criteria, which query plan to be used when processing a query, said criteria being based on the result from said cost calculating means (**Snodgrass** Paragraph 0016). **“and the timeframe”** as means for estimating the cost in processing resources according to each said query plan by estimating the selectivity of a temporal selection, said estimate of the selectivity intended for being performed by using the information that an end time of a period never precedes a start time of the period

(**Snodgrass** Paragraph 0020). “**on the basis of the monitored system parameters**” as FIG. 2 describes the main function of the Execution Engine, which receives an execution-ready plan consisting of a sequence of algorithms with their parameters and arguments (**Snodgrass** Paragraph 0032).

Claim 36 is essentially the same as claim 17 except it sets forth the claimed invention as a computer readable medium containing a program and is rejected for the same reasons as applied hereinabove.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 8-9, 13-14, 18-19, 27-28, 32-33, and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Snodgrass et al.** (U.S. PG Pub No. 2004/0117359) as applied to claims 1-7, 10-12, 15-17, 20-26, 29-31, 34-36, and 39-42 above, in view of **Lomet et al.** (**Lomet** hereinafter) (US Patent No. 5,212,788).

With respect to claim 8, **Snodgrass** teaches **the method of claim 7, wherein a plurality of suitable query execution schedules is determined and wherein the scheduling comprises:**

“timeframes of the plurality of suitable query execution schedules” as means for estimating the cost in processing resources according to each said query plan by estimating the selectivity of a temporal selection, said estimate of the selectivity intended for being performed by using the information that an end time of a period never precedes a start time of the period (**Snodgrass** Paragraph 0020).

“scheduling execution of the received query against the database” as a set of candidate algebraic query plans is produced by means of the optimizer's transformation rules and heuristics. Next, the optimizer considers in more detail each of these plans. For each algebraic operation in a plan, it assumes that each of the algorithms available for computing that operation is being used, and it estimates the consequent cost of computing the query. This way, one best physical query execution

plan, where all operations are specified by algorithms, is found for each original candidate plan (**Snodgrass** Paragraph 0028). Therefore one of the best plan/schedule is being chosen for the execution of a query.

Snodgrass teaches the elements of claim 8 as noted above but does not explicitly disclose the step of “**determining an intersection.**”

However, **Lomet** discloses “**determining an intersection**” as a transaction time is selected from the intersection of the voted time ranges and is used to timestamp all updated data that is durably stored when the transaction is committed (**Lomet** Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of the cited references because **Lomet’s** teaching would have allowed **Snodgrass** to facilitate determining the overlap in time of different timeframes, without hurting the system’s performance and also providing a delay lock mechanism (**Lomet** Col 1, Lines 50-58).

Claim 27 is essentially the same as claim 8 except it sets forth the claimed invention as a computer readable medium containing a program and is rejected for the same reasons as applied hereinabove.

With respect to claim 9, **Snodgrass** does not explicitly teach “**the method of claim 7, wherein a plurality of suitable query execution schedules is determined and wherein the scheduling comprises:**

determining an intersection of the timeframes of the plurality of suitable query execution schedules

determining whether the intersection is empty or not

if the intersection is not empty, scheduling execution of the received query against the database on the basis of the determined intersection

if the intersection is empty, notifying a user.”

However, Lomet discloses **the method of claim 7, wherein a plurality of suitable query execution schedules is determined and wherein the scheduling comprises:**

“determining an intersection of the timeframes of the plurality of suitable query execution schedules” as a transaction time is selected from the intersection of the voted time ranges and is used to timestamp all updated data that is durably stored when the transaction is committed (Lomet Abstract).

“determining whether the intersection is empty or not

if the intersection is not empty, scheduling execution of the received query against the database on the basis of the determined intersection” as if all the cohorts to a transaction vote to commit the transaction and the intersection of the voted time ranges is not empty, then the transaction is committed during the second phase of the protocol. Also a transaction time is selected from the intersection of the voted time ranges, and this selected transaction time is used to timestamp all updated data that is durably stored when the transaction is committed (Lomet Col 2 Lines 7-14). In these lines if the intersection time is not empty then the required operation is being performed.

“if the intersection is empty, notifying a user” if timestamp ranges voted by the cohorts to a transaction are not sufficiently large, the probability that their intersection is empty, forcing the transaction to abort, increases (**Lomet** Col 9, Lines 16-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of the cited references because **Lomet's** teaching would have allowed **Snodgrass** to facilitate determining the overlap in time of different timeframes, without hurting the system's performance and also providing a delay lock mechanism (**Lomet** Col 1, Lines 50-58).

Claim 28 is essentially the same as claim 9 except it sets forth the claimed invention as a computer readable medium containing a program and is rejected for the same reasons as applied hereinabove.

With respect to claim 13, **Snodgrass** does not explicitly teach **the method of claim 12, wherein the monitored system parameters comprise at least one of:**

- a peak query workload time period**
- a light query workload time period**
- a time pattern indicating availability of the database.**

However, **Lomet** discloses **the method of claim 12, wherein the monitored system parameters comprise at least one of:**

- a peak query workload time period**

a light query workload time period

“a time pattern indicating availability of the database” as a multiversion database is one, which can be queried (i.e., asked or interrogated) as to what the state of the database was at a specified time. In such multiversion databases, also called temporal databases, all updated data is "stamped" with a time value, usually with a time value corresponding to the time at which the data was updated. With the appropriate support (i.e., software), a query of the timestamped database can provide a transaction consistent view of the database, as it existed at a specified time (**Lomet Col 1, Lines 13-24**). Therefore a specific time/time pattern indicate the availability/existence of a database.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of the cited references because **Lomet's** teaching would have allowed **Snodgrass** to enhance the performance of the system by using the delay lock mechanism (**Lomet Col 2, Lines 40-46**), which keeps the record of state of database (availability of database) at specified times.

Claims 18, 32, and 37 are same as claim 13 except claims 32 and 37 set forth the claimed invention as a computer readable medium containing a program ands are rejected for the same reasons as applied hereinabove.

With respect to claim 14, **Snodgrass** does not explicitly teach **“the method of claim 13, wherein the database includes distributed data sources and wherein a**

separate time pattern is provided for each distributed data source, the separate time pattern indicating availability of a corresponding distributed data source."

However, **Lomet** discloses **"the method of claim 13, wherein the database includes distributed data sources and wherein a separate time pattern is provided for each distributed data source, the separate time pattern indicating availability of a corresponding distributed data source"** as a multiversion database is one, which can be queried (i.e., asked or interrogated) as to what the state of the database was at a specified time. In such multiversion databases, also called temporal databases, all updated data is "stamped" with a time value, usually with a time value corresponding to the time at which the data was updated. With the appropriate support (i.e., software), a query of the timestamped database can provide a transaction consistent view of the database, as it existed at a specified time (**Lomet** Col 1, Lines 13-24). Therefore a specific time/time pattern indicate the availability/existence of a database.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of the cited references because **Lomet's** teaching would have allowed **Snodgrass** to enhance the performance of the system by using the delay lock mechanism (**Lomet** Col 2, Lines 40-46), which keeps the record of state of database (availability of database) at specified times.

Claims 19, 33, and 38 are same as claim 14 except claims 33 and 38 set forth the claimed invention as a computer readable medium containing a program and are rejected for the same reasons as applied hereinabove.

Conclusion

5. The prior art made of record and not replied upon is considered pertinent to applicant's disclosure is listed on 892 form.

Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Usmaan Saeed whose telephone number is (571)272-4046. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on (571)272-3978. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Usmaan Saeed
Patent Examiner
Art Unit: 2166



Leslie Wong
Primary Examiner

US
January 05, 2006